PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2005-071713

(43)Date of publication of application : 17.03.2005

(51)Int.Cl. H01M 8/04
B65D 77/04
// H01M 8/10

(21)Application number : 2003-297700

(22)Date of filing : 21.08.2003

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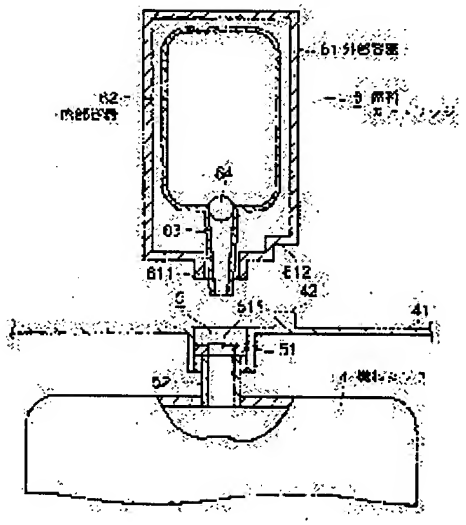
(54) LIQUID TYPE FUEL CELL AND FUEL CARTRIDGE USED BY CELL

(57)Abstract:

PROBLEM TO BE SOLVED: To miniaturize a container and a cell and make inexpensive the same, by maintaining stably the output even if it takes time to exchange the fuel container and by enabling to supply a liquid fuel stably without installing a pressure control mechanism.

SOLUTION: The fuel storing container is constituted of a fuel tank 4 provided in a case 41 of a DMFC and a fuel cartridge 6 installed detachably at the installation part 5. The fuel cartridge 6 is made a dual structure composed of an external container 61 constructed of hard case and an inner container 62 having a high shrinkage housed in this outer container 61, and a liquid fuel 8 is stored in this inner container 62.



LEGAL STATUS

[Date of request for examination] 14.08.2006

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]
[Claim 1]
The body of a fuel cell which held in the case the electromotive section which generates electricity by taking out a proton from liquid fuel,
The fuel tank which is held in the case of said body of a fuel cell, and supplies liquid fuel to said electromotive section,
It is equipped free [attachment and detachment] to said case, and the fuel cartridge which supplies liquid fuel to said fuel tank is provided,
Said fuel cartridge,
The 1st container which has shrinkage characteristics, holds liquid fuel and supplies this liquid fuel to said fuel tank,
The 2nd container which has rigidity and holds said 1st container in the interior
The liquid mold fuel cell characterized by preparation ******.
[Claim 2]
Said fuel cartridge,
The liquid mold fuel cell according to claim 1 characterized by having further a means to detect the amount of contraction of said 1st container, and to display the residue of liquid fuel based on this detected amount of contraction.
[Claim 3]
Said fuel cartridge,
The liquid mold fuel cell according to claim 1 or 2 characterized by having further teeming opening which makes the tapering configuration which makes the liquid fuel held in said 1st container flow into said fuel tank.
[Claim 4]
Said fuel cartridge,
The liquid mold fuel cell according to claim 1 or 2 characterized by having further the valve which prevents the back flow of said liquid fuel on the outflow way which makes the liquid fuel held in said 1st container flow into said fuel tank.
[Claim 5]
The liquid mold fuel cell according to claim 1 to 4 characterized by establishing a means to specify the wearing sense of said fuel cartridge to said case.
[Claim 6]
It is the fuel cartridge with which it is equipped free [attachment and detachment] to said case of the liquid mold fuel cell which held in the case the fuel tank which supplies liquid fuel to the electromotive section which generates electricity by taking out a proton from liquid fuel, and this electromotive section,
The 1st container which has shrinkage characteristics, holds liquid fuel and supplies this liquid fuel to said fuel tank,
The 2nd container which has rigidity and holds said 1st container in the interior
The fuel cartridge characterized by providing.
[Claim 7]
The fuel cartridge according to claim 6 characterized by having further a means to detect the amount of contraction of said 1st container, and to display the residue of liquid fuel based on this detected amount of

contraction.

[Claim 8]

The fuel cartridge according to claim 6 or 7 characterized by having further teeming opening which makes the tapering configuration which makes the liquid fuel held in said 1st container flow into said fuel tank.

[Claim 9]

The fuel cartridge according to claim 6 or 7 characterized by having further the valve which prevents the back flow of said liquid fuel on the outflow way which makes the liquid fuel held in said 1st container flow into said fuel tank.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
This invention relates to the fuel cartridge used with the fuel cell which uses liquid fuel like for example, a direct mold methanol fuel cell (DMFC), and this fuel cell.
[Background of the Invention]
[0002]
In recent years, the liquid mold fuel cell which generates electricity by taking out a direct proton from liquid fuel, such as a methanol and ethanol, is developed. This kind of fuel cell has an unnecessary reforming machine, and since there is little fuel volume and it ends, it is expected as a power source of pocket mold electronic equipment, such as a pocket mold personal computer, and PDA (Personal Digital Assistants), an image or an audio player.
[0003]
By the way, in order to take out an output stably in this kind of fuel cell, it is required that it should be stabilized and liquid fuel should be supplied. Moreover, to carry out continuous duty of the fuel cell over long duration, a fuel needs to be supplied. So, by making a fuel hold container into removable structure, for example to the body of a fuel cell, supply of a fuel is enabled, and by preparing a pressure-regulator style in a fuel hold container further, it constitutes from the former so that liquid fuel may always be supplied to the body of a fuel cell without excess and deficiency (see the patent reference 1.).
[Patent reference 1] JP,2001-93551,A
[Description of the Invention]
[Problem(s) to be Solved by the Invention]
[0004]
However, the above-mentioned conventional fuel cell has composition which generally attaches a fuel hold container in fuel installation tubing formed in the body of a fuel cell. For this reason, when once removing the lost fuel hold container, attaching a new fuel hold container and exchange took time amount by the reason of unfamiliar **, the fuel supplied to a stack between them might be exhausted, and the generation-of-electrical-energy output might become unstable. Moreover, when the pressure-regulator style was prepared in the fuel hold container, while becoming a failure at the time of a fuel hold container being enlarged and miniaturizing a fuel cell, there was a problem of causing a cost rise.
[0005]
it **s for offering the fuel cartridge used with the liquid mold fuel cell which enabled a miniaturization and low-pricing of a fuel hold container and a cell, and this fuel cell, as liquid fuel can supply to stability, without establishing the device for this invention having been made paying attention to the above-mentioned situation, maintaining an output to stability even if the place which makes into that purpose requires time amount for exchange of a fuel container, and adjusting a pressure .
[Means for Solving the Problem]
[0006]
In order to attain the above-mentioned purpose, it is equipped with the liquid mold fuel cell concerning this invention free [attachment and detachment] to the fuel tank which is held in the body of a fuel cell which held in the case the electromotive section which generates electricity by taking out a proton from liquid fuel, and the

case of this body of a fuel cell, and supplies liquid fuel to the above-mentioned electromotive section, and the above-mentioned case, and it possesses the fuel cartridge which supplies liquid fuel to the above-mentioned fuel tank. And the 1st container which has the shrinkage characteristics which hold liquid fuel for the above-mentioned fuel cartridge, and supply this liquid fuel to the above-mentioned fuel tank, and the 2nd container which has the rigidity which holds the 1st container of the above in the interior constitute.

[0007]

Therefore, according to this invention, a fuel hold container consists of a fuel tank prepared in a case, and a fuel cartridge with which it is equipped free [attachment and detachment] to a case. For this reason, in case a fuel cartridge is exchanged, even if exchange takes time amount by the reason of unfamiliar **, the electromotive section can perform a succeedingly stable generation of electrical energy in the meantime with the fuel which remains in the fuel tank.

[0008]

Moreover, the fuel cartridge has dual structure which consists of the 1st container (internal container) which has shrinkage characteristics, and the 2nd container (external container) which has the rigidity which holds this internal container. For this reason, although supply of liquid fuel progresses, the negative pressure in a fuel cartridge can be prevented from increasing, and it enables this to always supply the liquid fuel of a fuel cartridge to stability. Moreover, since it becomes unnecessary to prepare the pressure-regulator style for controlling negative pressure, a miniaturization and low-pricing of a fuel hold container and a fuel cell are attained.

[0009]

Moreover, this invention is characterized by establishing further a means to detect the amount of contraction of the 1st container of the above to the above-mentioned fuel cartridge, and to display the residue of liquid fuel on it based on this detected amount of contraction. Thus, if constituted, using [that is,] the high shrinkage characteristics which the 1st container has, using the property in which the amount of contraction changes in proportion to reduction in liquid fuel, the residue of the liquid fuel in a cartridge can be detected easily, and can be displayed.

[0010]

Furthermore, this invention is characterized also by attaching teeming opening which makes the tapering configuration which makes the liquid fuel held in the 1st container concerned flow into a fuel tank in the 1st container of a fuel cartridge. Thus, if constituted, liquid fuel will stop being able to flow backwards to a fuel cartridge easily from a fuel tank, and the stability of fuel supply will be raised.

[0011]

Moreover, the valve which prevents the back flow of liquid fuel may be prepared in the outflow way which makes the liquid fuel held in the 1st container flow into a fuel tank. Thus, if constituted, the back flow of liquid fuel can be certainly prevented from a fuel tank to a fuel cartridge, and, thereby, the stability of fuel supply can be raised further.

[0012]

Furthermore, it is good to establish a means to specify the wearing sense of the fuel cartridge to a case. Thus, if constituted, incorrect wearing of the fuel cartridge to a case can be prevented, and the stability of fuel supply and the dependability of a cell can be raised.

[Effect of the Invention]

[0013]

In short, by this invention, while constituting a fuel hold container from a fuel tank in which it is prepared in a case, and a fuel cartridge prepared free [attachment and detachment] to a case, it is considering as the dual structure which consists of the 1st container which has shrinkage characteristics for a fuel cartridge, and the 2nd container which has the rigidity which holds this internal container.

Therefore, even if exchange of a fuel container takes time amount, an output is maintainable to stability, liquid fuel can be supplied to stability, without establishing the device in which a pressure is adjusted further, and the fuel cartridge used with the liquid mold fuel cell which enabled a miniaturization and low-pricing of a container and a cell by this, and this fuel cell can be offered.

[Best Mode of Carrying Out the Invention]

[0014]

Drawing 1 is the outline block diagram of the direct mold methanol fuel cell (DMFC) which is 1 operation gestalt of the liquid mold fuel cell concerning this invention. This DMFC contains a fuel tank 4 in a case with the DMFC electromotive section 1, a control section 2, and the auxiliary power section 3.
The DMFC electromotive section 1 arranges the electrolyte membrane between the anode pole which consists of a charge collector and a catalyst bed, and the cathode pole which similarly consists of a charge collector and a catalyst bed. And a methanol water solution is supplied to an anode catalyst bed, and a proton (proton) is generated by catalytic reaction. On the other hand, air is supplied to a cathode pole. And in a cathode catalyst bed, by making the proton which passed through the above-mentioned electrolyte react with the oxygen contained in the air by which supply was carried out [above-mentioned], it generates electricity and the generated electron is taken out with a charge collector.
[0015]
The methanol water solution as a fuel is held in a fuel tank 4, and the anode catalyst bed of the above-mentioned DMFC electromotive section 1 is supplied through the supply way which does not illustrate this methanol water solution. Moreover, the applied part 5 is formed in the fuel tank 4. Where it was equipped with the fuel cartridge 6 free [attachment and detachment] and this applied part 5 is equipped, liquid fuel is supplied to a fuel tank 4 from the fuel cartridge 6.
[0016]
In addition, the auxiliary power section 3 is equipped with a rechargeable battery. This rechargeable battery is charged by the power outputted from the above-mentioned DMFC electromotive section 1. The auxiliary power section 3 is supplied to the pocket mold electronic equipment which does not output and illustrate the auxiliary power which supplies the insufficiency of the power outputted from the above-mentioned DMFC electromotive section 1 from the above-mentioned rechargeable battery according to the load of the pocket mold electronic equipment which is a candidate for electric supply.
[0017]
By the way, the above-mentioned fuel cartridge 6 and an applied part 5 are constituted as follows. Drawing 2 is the sectional view showing the configuration.
That is, the wearing opening 5 is formed in the case 41 of DMFC, it accepts in this wearing opening 5, and the plate 51 is being fixed. It accepts in the acceptance plate 51, opening 511 is formed, and it is connected with the introductory tubing 52 between this acceptance opening 511 and opening of a fuel tank 4. Moreover, as shown in the above-mentioned acceptance plate 51 at drawing 3 , terminals 53, 54, and 55 are provided. These terminals 53, 54, and 55 are used in order to connect electrically between the amount detector 9 of contraction which is established in the fuel cartridge 6 and which is mentioned later, and the remaining fuel detectors 10 which are established in the control section 2 in DMFC and which are mentioned later.
[0018]
On the other hand, the fuel cartridge 6 consists of an external container 61 which makes the shape of a cube type, and an internal container 62 which makes saccate [which is held in this external container 61]. The external container 61 is constituted by the resin product which has rigidity, and opening 611 is formed in the lower limit side. In addition, as resin which has rigidity, PPS (poly FENIN sulfide), PET (polyethylene terephthalate), HDPP (high density polypropylene), and LCP (liquid crystal polymer) are used, for example.
[0019]
On the other hand, the internal container 62 holds liquid fuel and is constituted by the rubber goods which have the corrosion resistance over liquid fuel, and high shrinkage characteristics, or the resin product. a material -- ** -- if it carries out, LDPP (low consistency propylene), and PET (polyethylene terephthalate), PE (polyethylene) and PBT (polybutylene terephthalate) are suitable, for example. Moreover, the teeming opening 63 which tapers off in the internal container 62 and makes a configuration is attached, and the point is exposed from the above-mentioned opening 611 of the external container 61. On the other hand, the spherical plug 64 is formed in the end face section of the teeming opening 63. In the condition of having not equipped said applied part 5 with the fuel cartridge 6, opening of this plug 64 is carried out in the condition of having blockaded and equipped with the teeming opening 63, and it enables the outflow of liquid fuel.
[0020]
Moreover, the crevice 612 is established in the lower limit side of the external container 61 of the fuel cartridge 6, and the projected part 42 is further formed in the above-mentioned crevice 612 of the above-mentioned case

41, and the corresponding location. In case these projected parts 42 and crevices 612 equip an applied part 5 with the fuel cartridge 6, they specify the wearing sense of the fuel cartridge 6 by being engaged mutually.
[0021]
Furthermore, the amount detector 9 of contraction is established in the fuel cartridge 6, and the remaining fuel detector 10 is established in the control section 2 in DMFC. The amount detector 9 of contraction measures the amount of contraction of the internal container 62 using a variable-resistance circuit, and consists of a linear resistor 91 fixed to the wall of the external container 61 as shown in drawing 4 , and a traveling contact 92 fixed to the crowning of the internal container 62.
[0022]
The remaining fuel detector 10 is equipped with the detection power source 101 and the current detector 102. The detection power source 101 supplies a current to the above-mentioned linear resistor 91 through a terminal 55. The current detector 102 detects the current value which returns from the above-mentioned linear resistor 91 through a traveling contact 92 and a terminal 54 as information showing the amount of contraction of the above-mentioned internal container 62.
[0023]
Moreover, the remaining fuel detector 10 is equipped with the residue conversion circuit 103, the drop 104, and the wearing detector 105. The wearing detector 105 detects the existence of wearing of the fuel cartridge 6 to an applied part 5 based on the potential of a terminal 53. Being equipped with the fuel cartridge 6 is in the condition detected by the above-mentioned wearing detector 105, and the residue conversion circuit 103 changes into a remaining fuel value the feedback current value detected by the above-mentioned current detector 102. As a transform-processing means, what carries out the multiplication of the predetermined multiplier, for example to a feedback current value, and the thing using the table which matched and memorized the feedback current value and the remaining fuel value are usable.
[0024]
An indicator 104 consists of an indicator of liquid crystal or a seven segment method, and carries out the digital readout of the information showing the remaining fuel value acquired by the above-mentioned residue conversion circuit 103 of a residue, for example, the rate. In addition, otherwise as a display means, what expresses a residue with the class of icon, a color, the die length and the color of a display pattern, and the number of lightings of light emitting diode can be considered.
[0025]
Next, actuation of the liquid mold fuel cell constituted as mentioned above is explained.
When using the fuel cartridge 6, a user equips the applied part 5 of the body of a fuel cell with the fuel cartridge 6. At this time, the sense of the fuel cartridge 6 is doubled so that the crevice 612 formed in the external container 61 of the fuel cartridge 6 may engage with the projected part 42 of a case 41. Incorrect wearing of the fuel cartridge 6 can be prevented by doing in this way.
[0026]
If equipped with the fuel cartridge 6, a plug 64 will be pushed up by the pin which is not illustrated, for example, and, thereby, between the internal container 62 and fuel tanks 4 will be open for free passage through the teeming opening 63 and the introductory tubing 52. Consequently, the liquid fuel 8 in the internal container 62 of the fuel cartridge 6 flows in a fuel tank 4 through the above-mentioned teeming opening 63 and the introductory tubing 52. Supply of liquid fuel is started in this way. The condition of the fuel cartridge 6 at this time is shown in drawing 5 (a).
[0027]
By the way, the liquid fuel supply way in a fuel tank 4 is filled with the condition of being equipped with the above-mentioned fuel cartridge 6 by liquid fuel 8, from the internal container 62 of the fuel cartridge 6. For this reason, if supply of liquid fuel 8 advances and the liquid fuel 8 in the internal container 62 of the fuel cartridge 6 decreases in number, negative pressure will occur within the internal container 62 of the fuel cartridge 6. However, since it is constituted by the ingredient which has high shrinkage characteristics, the internal container 62 contracts the internal container 62 smoothly, as shown in drawing 5 (b). For this reason, the negative pressure in the internal container 62 is maintained at a small value. Therefore, liquid fuel is supplied to constant-rate [every] stability to the last.
Moreover, taper formation is carried out and the teeming opening 63 of the fuel cartridge 6 serves as a tapering

configuration. For this reason, even if the negative pressure in the interior container 62 of a metaphor increases, the back flow of liquid fuel 8 is suppressed effectively.

[0028]

Furthermore, by the control section 2, residue detection of the fuel in the fuel cartridge 6 is performed as follows during supply of the above-mentioned liquid fuel 8. That is, supply of liquid fuel 8 progresses and the internal container 62 of the fuel cartridge 6 presupposes that it contracted in the condition which shows in a two-dot chain line B from the condition of the continuous line A shown in drawing 4 in connection with this. If it does so, it will move so that a traveling contact 92 may illustrate according to the above-mentioned contraction. For this reason, in the remaining fuel detector 10, the current value detected with the current detector 102 increases, and this increased current value is changed into remaining fuel by the residue conversion circuit 103. And this residue value is displayed on a drop 104 as a survival rate. Therefore, a user can always grasp the remaining fuel in the fuel cartridge 6 correctly.

[0029]

As stated above, while forming a fuel tank 4 in the case 41 of DMFC, it constitutes from this operation gestalt so that an applied part 5 may be equipped with the fuel cartridge 6, enabling free attachment and detachment. For this reason, in case the fuel cartridge 6 is exchanged, even if exchange takes time amount by the reason of unfamiliar **, the DMFC electromotive section 1 can continue a generation of electrical energy stably in the meantime with the fuel which remains in the fuel tank 4.

[0030]

Moreover, the fuel cartridge 6 has dual structure which consists of an external container 61 constituted in the hard case, and an internal container 62 which has the high shrinkage characteristics held in this external container 61. For this reason, although supply of liquid fuel 8 progresses, the increment in the negative pressure in the internal container 62 can be controlled, and thereby, the supply of liquid fuel 8 into a fuel tank 4 from the fuel cartridge 6 can be held to stability. Moreover, since it becomes unnecessary to prepare a pressure-regulator style like before in order to control negative pressure, a miniaturization and low-pricing of the fuel cartridge 6 and the body of a fuel cell are attained.

[0031]

Furthermore, he detects the amount of contraction of the internal container 62 of the above-mentioned fuel cartridge 6, and is trying to display the residue of liquid fuel based on this detected amount of contraction. For this reason, using [that is,] the high shrinkage characteristics which the internal container 62 has, according to reduction of liquid fuel 8, using the property to change to a linear mostly, the amount of contraction can detect simply and correctly the residue of the liquid fuel 8 in the fuel cartridge 6, and can display it.

[0032]

Furthermore, even if the negative pressure in the interior container 62 of a metaphor increases by having formed the teeming opening 63 which tapers off to the fuel cartridge 6 and makes a configuration, the back flow of liquid fuel 8 can be suppressed effectively, and, thereby, the stability of fuel supply can be maintained. Furthermore, in case an applied part 5 is equipped with the fuel cartridge 6, incorrect wearing of the fuel cartridge 6 can be prevented by doubling the sense of the fuel cartridge 6 so that the crevice 612 formed in the external container 61 of the fuel cartridge 6 may engage with the projected part 42 of a case 41.

[0033]

In addition, this invention is not limited to the above-mentioned operation gestalt. For example, the rubber-like quality of the material constitutes the internal container 62 of the fuel cartridge 6, and liquid fuel is made to hold, where this is swollen like a balloon. If it does in this way, although supply of liquid fuel progresses, negative pressure does not occur and, thereby, liquid fuel can be further supplied to stability. Moreover, the peripheral surface of an internal container may be formed in the shape of bellows. Negative pressure is effectively absorbable if it does in this way.

[0034]

Moreover, the current value which flows a variable resistor 91 detected the amount of contraction of the internal container 62, and this detected current value is changed into the residue value of liquid fuel, and was expressed as said operation gestalt. However, you may make it detect not using the thing limited to it but using a photosensor. That is, while fixing a light emitting device to the crowning of the internal container 62, a photo detector array is arranged in the medial surface of the external container 61. And a photo detector array detects

the location of a light emitting device moved according to contraction of the internal container 62, this location detecting signal is changed into the residue value of liquid fuel, and it displays on a drop 104.

[0035]

Moreover, although the control section 2 of the body of a fuel cell was made to perform residue detection and a display of liquid fuel 8 with said operation gestalt, in the fuel cartridge 6, it may be made to perform residue detection and a display of liquid fuel 8 to the fuel cartridge 6 by forming a detector and an indicator. An indicator is good in that case to establish the top face of the external container of a fuel cartridge etc. in the location which is easy to check by looking.

[0036]

Furthermore, with said operation gestalt, while forming the projected part 42 in the case 41 of the body of a fuel cell, the wearing sense of the fuel cartridge 6 was specified by establishing the crevice 612 which engages with the above-mentioned projected part 42 in the fuel cartridge 6. However, you may make it by carrying out eccentricity of the location of the fuel acceptance opening 511 not only in it but the fuel tank 4 or the fuel teeming opening 63 in the fuel cartridge 6 from the center position of an applied part 5 prescribe the wearing sense of the fuel cartridge 6.

[0037]

Taper formation of the teeming opening 63 of the fuel cartridge 6 is carried out, and he considers as a tapering configuration, and is trying for this to reduce the back flow of liquid fuel 8 with said operation gestalt furthermore. However, a check valve is attached in teeming opening of not only this but the fuel cartridge 6, and you may make it prevent the back flow of liquid fuel 8 by this check valve.

[0038]

Furthermore, said operation gestalt explained taking the case of the DMFC system which used the methanol as liquid fuel. However, each water solution of ethanol, diethylether, dimethoxymethane, formaldehyde, a formic acid, methyl formate, ORUTOGI acid methyl, a trioxane, 1-propanol, 2-propanol, 3-propanol, ethylene glycol, a glyoxal, a glycerol, and a hydrazine can be used not only as it but as liquid fuel, and the water solution of the compound of each above-mentioned chemical can also be used further.

[0039]

In addition, also with the configuration of the configuration of a fuel cartridge, the quality of the material of an external container and an internal container, the structure of an applied part, the residue detection means of liquid fuel, and the wearing sense convention means of a fuel cartridge, and the configuration of the antisuckback means of liquid fuel, in the range which does not deviate from the summary of this invention, it deforms variously and can carry out.

[0040]

in short -- this invention -- the above-mentioned operation gestalt -- it is not limited as it is, and in an execution phase, in the range which does not deviate from that summary, a component is deformed and shape can be taken. Moreover, various invention can be formed with combination with two or more proper components currently indicated by the above-mentioned operation gestalt. For example, some components may be deleted from all the components shown in an operation gestalt. Furthermore, the component covering a different operation gestalt may be combined suitably.

[Brief Description of the Drawings]

[0041]

[Drawing 1] Drawing showing the outline configuration of the direct mold methanol fuel cell which is 1 operation gestalt of the liquid mold fuel cell concerning this invention

[Drawing 2] Drawing showing the configuration of the fuel cartridge and applied part which are an important section of the liquid mold fuel cell shown in drawing 1

[Drawing 3] Drawing showing the configuration of the acceptance plate formed in the applied part shown in drawing 2

[Drawing 4] Drawing showing the configuration of the remaining fuel detecting element prepared in the amount detecting element of contraction and DMFC control section of an internal container which are prepared in a fuel cartridge

[Drawing 5] Drawing showing the relation nature of the remaining fuel in a fuel cartridge, and change of an internal container.

[Description of Notations]
[0042]
1 -- The direct mold methanol fuel cell electromotive section (DMFC electromotive section), 2 -- Control section, 3 [-- Fuel cartridge,] -- The auxiliary power section, 4 -- A fuel tank, 5 -- An applied part, 6 7 -- The output section, 8 -- Liquid fuel (methanol water solution), 9 -- Contraction sensor, 10 [-- Acceptance plate,] -- A residue detector, 41 -- A case, 42 -- A projected part, 51 511 [-- An external container, 62 / -- An internal container, 63 / -- Teeming opening, 64 / -- A plug, 91 / -- A resistor, 92 / -- A traveling contact, 101 / -- A detection power source, 102 / -- A current detector, 103 / -- A residue conversion circuit, 104 / -- A drop, 105 / -- Wearing detector.] -- Acceptance opening, 52 -- Introductory tubing, 53, 54, 55 -- A terminal, 61

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[0041]
[Drawing 1] Drawing showing the outline configuration of the direct mold methanol fuel cell which is 1 operation gestalt of the liquid mold fuel cell concerning this invention
[Drawing 2] Drawing showing the configuration of the fuel cartridge and applied part which are an important section of the liquid mold fuel cell shown in drawing 1
[Drawing 3] Drawing showing the configuration of the acceptance plate formed in the applied part shown in drawing 2
[Drawing 4] Drawing showing the configuration of the remaining fuel detecting element prepared in the amount detecting element of contraction and DMFC control section of an internal container which are prepared in a fuel cartridge
[Drawing 5] Drawing showing the relation nature of the remaining fuel in a fuel cartridge, and change of an internal container.

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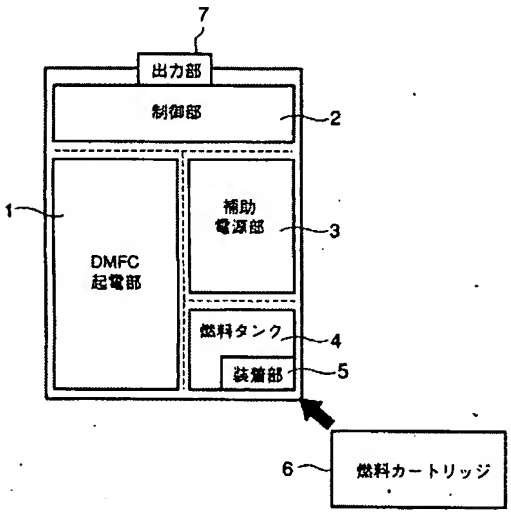
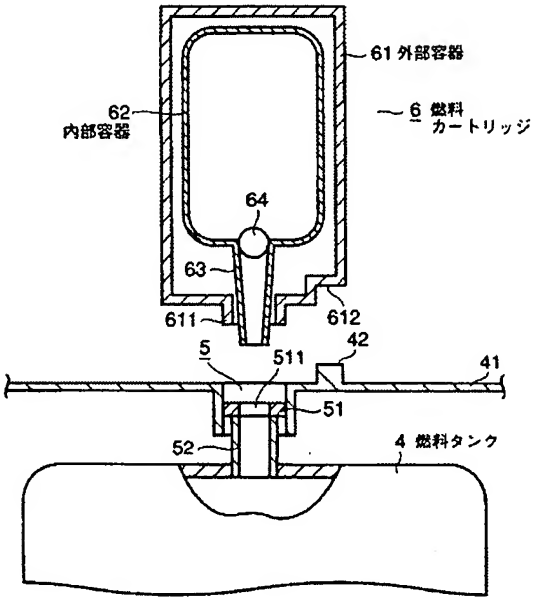
DRAWINGS

[Drawing 1]



[Drawing 2]



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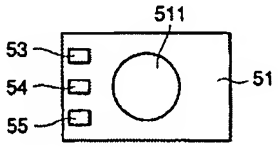

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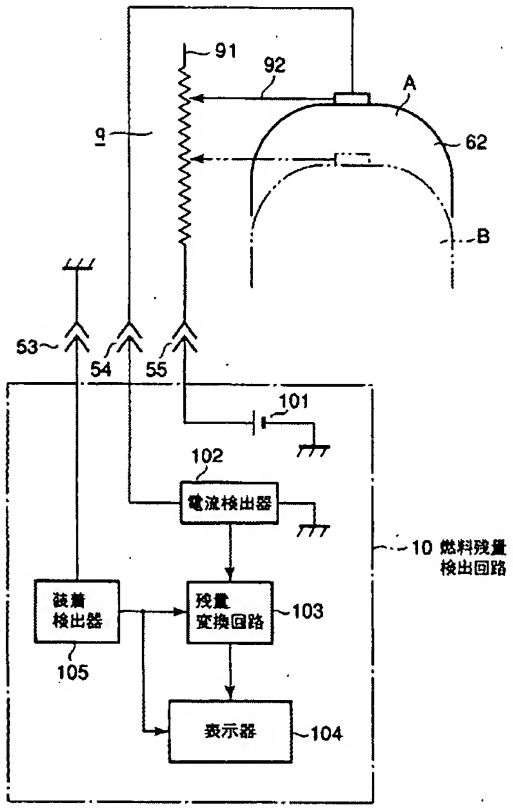
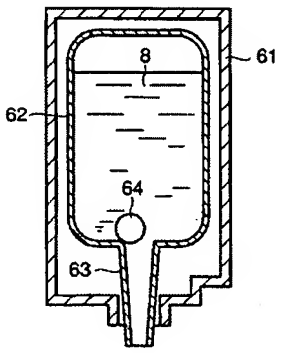

91
92
A
9
62
B
53
54
55
101
102
電流検出器
10 燃料残量
検出回路
装着
検出器
残量
変換回路
103
105
表示器
104

[Drawing 5]

(a)



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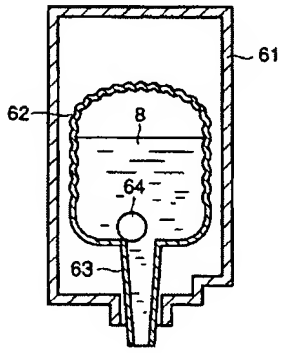

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